

Hydrological Revival Possibilities for River Assi: A Tributary of the River Ganga in the Middle Ganga Basin

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Abstract : Streams and rivulets are crucial in maintaining river networks and their hydrology, influencing downstream ecosystems, and connecting different watersheds of urban and rural areas. The river Assi, an urban river, once a lifeline for the locals, has degraded over time. Evidence, such as the presence of paleochannels and patterns of water bodies and settlements, suggests that the river Assi was initially an alluvial stream or rivulet that originated near Rishi Durvasha Ashram near Prayagraj, flowing approximately 120 km before joining the river Ganga at Assi ghat in Varanasi. Presently, a major challenge is that nearly 90% of its original channel has been silted and disappeared, with only the last 8 km retaining some semblance of a river. It is possible that initially, the river Assi branched off from the river Ganga and functioned as a Yazoo stream. In this study, paleochannels of the river Assi were identified using Landsat 5 imageries and SRTM DEM. The study employed the Normalized Difference Vegetation Seasonality Index (NDVSI) and Principal Component Analysis (PCA) of the Normalized Difference Vegetation Index (NDVI) to detect these paleochannels. The average elevation of the sub-basin at the Durvasha Rishi Ashram of river Assi is 96 meters, while it reduces to 80 meters near its confluence with the Ganga in Varanasi, resulting in a 16-meter elevation drop along its course. There are 81 subbasins covering an area of 83,241 square kilometers. It is possible that due to the increased resistance in the flow of river Assi near urban areas of Varanasi, a new channel, Morwa, has originated at an elevation of 87 meters, meeting river Varuna at an elevation of 79 meters. The difference in elevation is 8 meters. Furthermore, the study explored the possibility of restoring the paleochannel of the river Assi and nearby ponds and water bodies to improve the river's base flow and overall hydrological conditions.

Keywords : River Assi, small river restoration, paleochannel identification, remote sensing, GIS

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